

***Amendments to the Claims***

1. (previously presented) A radio frequency identification (RFID) integrated circuit (IC), comprising:

a first antenna pad;

a second antenna pad;

a first modulator coupled to said first antenna pad, wherein said first modulator is configured to backscatter modulate a first symbol received from said first antenna pad with a response symbol, wherein said first modulator is configured to output said backscatter modulated first symbol to said first antenna pad;

a second modulator coupled to said second antenna pad, wherein said second modulator is configured to backscatter modulate a second symbol received from said second antenna pad with the response symbol, wherein said second modulator is configured to output said backscatter modulated second symbol to said second antenna pad;

a first charge pump coupled to said first antenna pad, said first charge pump configured to convert a first high frequency signal from said first antenna pad to a first substantially direct current (DC) voltage; and

a second charge pump coupled to said second antenna pad, said second charge pump configured to convert a second high frequency signal from said second antenna pad to a second substantially direct current (DC) voltage.

2. (original) The RFID IC of claim 1, further comprising:

a first receiver coupled to said first antenna pad, wherein said first receiver receives said first symbol from said first antenna pad and outputs a first received signal; and

a second receiver coupled to said second antenna pad, wherein said second receiver receives said second symbol from said second antenna pad and outputs a second received signal.

3. (original) The RFID IC of claim 2, further comprising:

a state machine configured to receive said first received signal and said second received signal and generate said response symbol.

4. (original) The RFID IC of claim 3, further comprising:

a data programming unit that stores a tag identification number.

5. (original) The RFID IC of claim 4, wherein said state machine is configured to read said stored tag identification number, wherein said state machine is configured to generate said response symbol using said first received signal, said second received signal, and a bit of said read tag identification number.

6-10. (canceled)

11. (previously presented) A radio frequency identification (RFID) tag device, comprising:

a first antenna;

a second antenna;

a first receiver coupled to said first antenna, wherein said first receiver is configured to receive a first symbol from said first antenna, and wherein said first receiver is configured to generate a first received signal;

a first modulator coupled to said first antenna, wherein said first modulator is configured to backscatter modulate the received first symbol with a response symbol, wherein said backscatter modulated first symbol is output to said first antenna;

a first charge pump coupled to said first antenna, said first charge pump configured to convert a first high frequency signal from said first antenna to a first substantially direct current (DC) voltage;

a second receiver coupled to said second antenna, wherein said second receiver is configured to receive a second symbol from said second antenna, and wherein said second receiver is configured to generate a second received signal;

a second modulator coupled to said second antenna, wherein said second modulator is configured to backscatter modulate the received second symbol with the response symbol, wherein said backscatter modulated second symbol is output to said second antenna;

a second charge pump coupled to said second antenna, said second charge pump configured to convert a second high frequency signal from said second antenna to a second substantially direct current (DC) voltage; and

a state machine coupled to said data programming unit and said first and said second receivers.

12. (original) The RFID tag device of claim 11, wherein said state machine is configured to receive said first received signal from said first receiver and to receive said second received signal from said second receiver, wherein said state machine generates said response symbol.

13. (original) The RFID tag device of claim 12, further comprising:  
a data programming unit that stores a tag identification number.

14. (original) The RFID tag device of claim 13, wherein said state machine is configured to read said stored tag identification number, wherein said state machine is configured to generate said response symbol using said received signal and a bit of said read tag identification number.

15-20. (canceled)

21. (previously presented) The RFID IC of claim 1, further comprising:  
a node at which said first substantially DC voltage signal and said second substantially DC voltage signal are coupled together.

22. (previously presented) The RFID IC of claim 21, further comprising:  
a power bus coupled to said node to route power to one or more components of the RFID IC.

23. (previously presented) The RFID IC of claim 1, further comprising:

means for storing a bit pattern.

24. (previously presented) The RFID tag device of claim 11, further comprising:

a node at which said first substantially DC voltage signal and said second substantially DC voltage signal are coupled together.

25. (previously presented) The RFID tag device of claim 24, further comprising:

a power bus coupled to said node to route power to at least said state machine.

26. (previously presented) The RFID tag device of claim 11, further comprising:

means for storing a bit pattern.

27. (previously presented) The RFID tag device of claim 24, further comprising:

means for communicating with a reader using a binary traversal algorithm, said binary traversal algorithm comparing bits within the bit pattern to symbols received from said reader.

28. (previously presented) The RFID tag device of claim 11, further comprising:

a substrate having an input capable of receiving a high frequency signal;

wherein said first antenna and said second antenna are disposed on said substrate.

29. (new) The RFID IC of claim 1, further comprising:

a first data recovery circuit coupled to said first antenna pad, said first data recovery circuit configured to demodulate said first high frequency signal to a first demodulated signal; and

a second data recovery circuit coupled to said second antenna pad, said second data recovery circuit configured to convert said second high frequency signal to a second demodulated signal.

30. (new) The RFID IC of claim 29, wherein said first data recovery circuit comprises a third charge pump configured to detect an amplitude envelope of said first high frequency signal, and wherein said second data recovery circuit comprises a fourth charge pump configured to detect an amplitude envelope of said second high frequency signal.

31. (new) The RFID IC of claim 29, wherein said first demodulated signal and said second demodulated signal are combined according to a logical OR function to output an information signal.

32. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;

an integrated circuit (IC) die mounted to said substrate, said IC die having first and second radio frequency (RF) input pads;

a first antenna formed on said substrate, and coupled to said first RF input pad;

and

a second antenna formed on said substrate, and coupled to said second RF input pad;

wherein said first antenna is configured to operate in a first frequency band and said second antenna is configured to operate in a second frequency band, wherein said first frequency band is different from said second frequency band.

33. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;

an integrated circuit (IC) die mounted to said substrate, said IC die having a plurality of radio frequency (RF) input pads;

a plurality of antennas formed on said substrate, each coupled to a corresponding one of the plurality of RF input pads; and

wherein each of said plurality of antennas is configured to operate at a corresponding frequency band different from frequency bands of the others of said plurality of antennas.

34. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;

an integrated circuit (IC) die mounted to said substrate, said IC die having first and second radio frequency (RF) input pads;

a first antenna formed on said substrate and coupled to said first RF input pad;  
and

a second antenna formed on said substrate and coupled to said second RF input pad;

wherein said first antenna has a first orientation and said second antenna has a second orientation, wherein said first orientation is different from said second orientation.

35. (new) The RFID tag device of claim 34, wherein the first orientation provides a substantially maximum gain for the first antenna in a first direction, and wherein the first direction correlates to a direction of substantially minimum gain for the second antenna.

36. (new) The RFID tag device of claim 35, wherein the second orientation provides substantially maximum gain for the second antenna in a second direction, and wherein the second direction correlates to a direction of substantially minimum gain for the first antenna.

37. (new) The RFID tag device of claim 34, wherein the first antenna is a first dipole antenna and the second antenna is a second dipole antenna.

38. (new) The RFID tag device of claim 34, wherein the first orientation is at a 90 degree angle to the second orientation.

39. (new) The RFID tag device of claim 34, wherein said first antenna is configured to operate in a first frequency band, and wherein said second antenna is configured to operate in a second frequency band.

40. (new) A radio frequency identification (RFID) tag device, comprising:



a substrate;  
an integrated circuit (IC) die mounted to said substrate, said IC die having a plurality of radio frequency (RF) input pads;  
a plurality of antennas formed on said substrate, each coupled to a corresponding one of the plurality of RF input pads; and  
wherein each of said plurality of antennas has a corresponding orientation different from orientations of the others of said plurality of antennas.

41. (new) The RFID tag device of claim 40, wherein said plurality of antennas are oriented such that an average gain over all orientations of said plurality of antennas is increased with respect to each of said plurality of antennas separately.

42. (new) The RFID tag device of claim 40, wherein each of said plurality of antennas in a corresponding frequency band different from the frequency band of the others of said plurality of antennas.

43. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;  
an integrated circuit (IC) die mounted to said substrate, said IC die having first and second radio frequency (RF) input pads;  
a first antenna formed on said substrate and coupled to said first RF input pad;  
and  
a second antenna formed on said substrate and coupled to said second RF input pad;

wherein said first antenna is positioned on said substrate at distance from said second antenna, wherein said distance is substantially equal to  $1/2$  of a wavelength of a signal of interest.

44. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;

an integrated circuit (IC) die mounted to said substrate, said IC die having a first radio frequency (RF) input pad, a second RF input pad, and a ground pad;

a first antenna formed on said substrate and coupled between said first RF input pad and said ground pad; and

a second antenna formed on said substrate and coupled between said second RF input pad and said ground pad.

45. (new) A radio frequency identification (RFID) tag device, comprising:

a substrate;

an integrated circuit (IC) die mounted to said substrate, said IC die having a first radio frequency (RF) pad, a second RF pad, a third RF pad, and a fourth RF pad;

a first antenna formed on said substrate and coupled between said first RF pad and said second RF pad; and

a second antenna formed on said substrate and coupled between said third RF pad and said fourth RF pad.